REMARKS

This Response is submitted in reply to the non-final Office Action mailed on January 30, 2009. No fee is due in connection with this Response. The Director is authorized to charge any fees which may be required, or to credit any overpayment to Deposit Account No. 02-1818. If such a withdrawal is made, please indicate the Attorney Docket No. 112857-458 on the account statement.

Claims 20-40 are pending in this application. Claims 22-38 were previously withdrawn from consideration and Claims 1-19 were previously canceled without prejudice or disclaimer. In the Office Action, Claims 39-40 are rejected under 35 U.S.C. §112. Claims 20-21 are rejected under 35 U.S.C. §103. For at least the reasons set forth below, Applicants respectfully submit that the rejections should be withdrawn.

In the Office Action, Claims 39-40 are rejected under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the written description requirement. The Patent Office asserts that the Specification discloses that no voltage is applied when a moisture carrier is used and fails to indicate anywhere else that voltage may be applied when a moisture carrier is used. See, Office Action, page 3, lines 3-6. Specifically, the Patent Office alleges that one of ordinary skill in the art would not understand from the Specification as a whole that a moisture carrier was usable together with voltage application. See, Office Action, page 2, lines 12-16. However, contrary to the Patent Office's assertion, the Specification indicates in several places that voltage may be applied when a moisture carrier is used. For example, the Abstract expressly states that excess moisture in a hydrogen flow path may be removed "[b]y using a moisture carrier or proton conductor, a catalyst and voltage applying means." See, Abstract, lines 7-10. The Specification also describes one embodiment in which element 70 may be either a moisture carrier or a proton conductor. See, Specification, page 13, paragraph 152, lines 3-9. The Specification further describes this embodiment as including voltage application electrodes formed on both sides of the moisture carrier 70. See, Specification, page 13, paragraph 153, lines 1-12.

Furthermore, Applicants respectfully submit that one of ordinary skill in the art would understand the disclosure of voltage application with a proton conductor to apply to the moisture carrier, as well. For example, the Specification expressly discloses that "[a]s the moisture carrier 91, for example, a perfluorosulfonic acid film or a Nafion film (fluororesin), which is a proton conducting membrane, . . . or the like may be used." See, Specification, page 14, paragraph 166,

lines 7-10. The Specification reiterates that the moisture carrier may contain a proton conductor such as a perfluorosulfonic acid polymer. See, Specification, page 5, paragraph 47. As such, Applicants respectfully submit that one of ordinary skill in the art would understand that the moisture carrier can be a proton conductor. The Specification repeatedly states that a proton conductor may be sandwiched between two electrodes and a voltage applied between the electrodes. See, Specification, page 3, paragraphs 26-27; paragraph 32; page 4, paragraph 43; page 8, paragraphs 102-103. Therefore, one of ordinary skill in the art viewing the Specification as whole would understand that a voltage may be applied to either a proton conductor or a moisture carrier to move water from one hydrogen flow path to the other hydrogen flow path. See, Specification, page 8, paragraph 102, lines 10-20.

Moreover, Applicants note that the portion of the Specification relied on by the Patent Office merely recites one embodiment of the invention in which no voltage is applied when a moisture carrier is used. Where a disclosure does not convey that a specific embodiment is critical to the invention or describe the embodiment as the only feasible design, the claims are not unambiguously limited to the single embodiment. See, *Cordis Corp. v. Medtronic AVE, Inc.*, 339 F.3d 1352, 1365 (Fed. Cir. 2003). The present Specification does not teach that an embodiment in which no voltage is applied when a moisture carrier is used is critical to the invention or that such an embodiment is the only feasible design. Instead, the portion of the Specification cited by the Patent Office merely discloses that in one embodiment, no voltage is applied and moisture is instead moved across the moisture carrier by natural diffusion due to the humidity difference between the hydrogen flow paths. See, Specification, pages 13-14, paragraph 159. Because no voltage application is necessary in this embodiment, the structure of the apparatus may be simplified. See, Specification, page 17, paragraph 193. However, nowhere does the Specification disclose that the use of the moisture carrier is limited to this embodiment.

In fact, the Specification expressly discloses that "the present invention is not limited to the above embodiment[s]. . . . The present invention can be varied or modified as long as it is not deviated form the effect aimed at by the present invention." See, Specification, page 20, paragraph 229. The Specification teaches that the entire purpose of the present claims is to use a moisture carrier or proton conductor to control the moisture content of hydrogen gas in a fuel cell in order to keep the humidity of the hydrogen gas constant. See, Specification, Abstract, lines 1-11; page 20, paragraphs 230 and 232. As discussed previously, one of ordinary skill in the art would understand that a voltage may be applied when a moisture carrier is used to move

moisture and keep the humidity of the hydrogen gas constant. Thus, Applicants respectfully submit that one of ordinary skill in the art viewing the Specification as a whole would understand that the inventors had possession of an apparatus in which a moisture carrier could be used together with a voltage to control the humidity of hydrogen gas in a fuel cell.

Accordingly, Applicants respectfully request that the rejection of Claims 39-40 under 35 U.S.C. §112, first paragraph, be withdrawn.

In the Office Action, Claims 20-21 are rejected under 35 U.S.C. §103(a) as being unpatentable over Japanese Patent Publication No. JP 06-130238 to Yasutaka ("*Yasutaka*") in view of U.S. Patent Publication No. 2002/0058168 A1 to Voss et al. ("*Voss*"). For at least the reasons set forth below, Applicants respectfully submit that the cited references fail to disclose or suggest each and every element of Claims 20-21.

Independent Claim 20 recites, in part, a hydrogen gas humidity control apparatus, comprising: a first hydrogen flow path or chamber thereof to which at least hydrogen gas is supplied; a second hydrogen flow path or chamber thereof to which at least hydrogen gas is supplied; and a moisture carrier for separating the first hydrogen flow path or chamber thereof from the second hydrogen flow path or chamber thereof and for allowing at least one of water and water vapor to pass therethrough, wherein the first hydrogen flow path or chamber is simultaneously in contact with: (i) a proton conductor membrane electrode assembly on a first side; and (ii) the moisture carrier on an opposite side. By providing the membrane electrode assembly and the moisture carrier simultaneously in contact with a hydrogen flow path, the humidity of hydrogen gas flowing toward the power generating section and flowing toward the moisture carrier can be kept at a similar level. See, Specification, paragraph 138, lines 7-13. In contrast, the cited references fail to disclose every element of independent Claim 20 and Claim 21 that depends therefrom.

For example, the cited references fail to disclose or suggest a hydrogen gas humidity control apparatus comprising a moisture carrier for separating a first hydrogen flow path or chamber thereof from a second hydrogen flow path or chamber, wherein the first hydrogen flow path or chamber is simultaneously in contact with: (i) a proton conductor membrane electrode assembly on a first side; and (ii) the moisture carrier on an opposite side as recited, in part, by independent Claim 20. The Patent Office acknowledges that the film of *Yasutaka* is shown as a separate element on the side of the fuel cell such that the hydrogen flow path is not simultaneously in contact with a membrane electrode assembly and a moisture carrier. See,

Office Action, page 4, lines 15-16. Instead, the Patent Office relies on *Voss* for the claimed element and asserts that it would have been obvious to one of ordinary skill in the art to utilize *Voss*'s teaching of stacking a humidity exchanger on the fuel cell and stack the fuel gas humidification equipment on the fuel electrode of *Yasutaka*. See, Office Action, page 4, lines 19-22; page 5, lines 1-2.

Even if the Patent Office's assertion is correct, *Voss* still fails to disclose a first hydrogen flow path or chamber simultaneously in contact with: (i) a proton conductor membrane electrode assembly on a first side; and (ii) the moisture carrier on an opposite side as required, in part, by the present claims. *Voss* is entirely directed to heating and humidifying a reactant gas supply stream by flowing a reactant gas supply stream and a fuel cell exhaust gas stream on opposite sides of a water permeable membrane in a combined heat and humidity exchange apparatus ("CHHE"). See, *Voss*, Abstract, lines 1-10. The portion of *Voss* relied on by the Patent Office merely discloses that the CHHE is in contact with a solid polymer fuel cell stack, rather than integrated with the fuel cell such that the hydrogen flow path is simultaneously in contact with the membrane electrode assembly and the moisture carrier. See, *Voss*, page 5, paragraph 60, lines 1-2; Fig. 2. The reactant supply must flow from the CHHE to the fuel cell through air inlet conduit 330 which is external to both the fuel cell and the CHHE. See, *Voss*, page 5, paragraph 61, lines 1-5; Fig. 2. As such, the reactant flow path cannot be simultaneously in contact with the membrane electrode assembly and the water permeable membrane in the CHHE.

In fact, *Voss* expressly states that "[t]he CHHE is preferably external to the solid polymer fuel cell." See, *Voss*, page 3, paragraph 34, lines 1-2. Although the CHHE may be connected to a fuel cell stack, *Voss* merely discloses that it is a separately housed module which is in direct thermal contact with a fuel cell stack. See, *Voss*, page 3, paragraph 35, lines 1-3; paragraph 36, lines 1-4. Furthermore, although *Voss* states that, in a less preferable embodiment, the CHHE could be incorporated between the end plates of the fuel cell stack, *Voss* expressly states that the CHHE *may not* be incorporated between the bus plates of the fuel cell stack. See, *Voss*, page 3, paragraph 36, lines 9-12. When describing incorporating a humidifier between the end plates of a fuel cell stack, *Voss* refers to U.S. Patent No. 5,382,478 to Chow et al. ("*Chow*"). See, *Voss*, page 1, paragraph 7, lines 7-14. *Chow* teaches that the membrane electrode assembly of the fuel cell is located between the bus plates. See, *Chow*, column 7, lines 36-37 and 63-67; Figs. 3 and 5. Therefore, because *Voss* expressly states that its CHHE may not be incorporated between the bus plates, the reactant supply flow stream of *Voss* cannot be in simultaneous contact with the

moisture carrier in the CHHE and a membrane electrode assembly of the fuel cell stack.

Unlike the CHHE of *Voss*, the hydrogen gas humidity control apparatus of the present claims is not merely stacked on top of a fuel cell but rather is integrated within the fuel cell such that the first hydrogen flow path or chamber is in contact with a proton conductor membrane electrode assembly of the fuel cell on one side and the moisture carrier on an opposite side. See, Specification, page 3, paragraph 22, lines 6-9; paragraph 30, lines 8-11; page 4, paragraph 41, lines 1-20; page 11, page 13, paragraph 151, lines 1-6; paragraph 152, lines 1-12; paragraphs 155-158; page 14, paragraph 161, lines 1-7; Figs. 1, 6 and 9. By providing the power generating section and the moisture carrier close to each other, the humidity of hydrogen gas flowing toward the power generating section and flowing toward the moisture carrier can be kept at a similar level. See, Specification, paragraph 138, lines 7-13. In contrast, *Yasutaka* and *Voss* fail to disclose a humidity control apparatus integrated within the fuel cell such that a hydrogen flow path is in contact with both the membrane electrode assembly and the moisture carrier. Thus, the cited references fail to disclose or suggest a hydrogen gas humidity control apparatus comprising a moisture carrier for separating a first hydrogen flow path or chamber thereof from a second hydrogen flow path or chamber, wherein the first hydrogen flow path or chamber is simultaneously in contact with: (i) a proton conductor membrane electrode assembly on a first side; and (ii) the moisture carrier on an opposite side in accordance with the present claims.

Accordingly, Applicants respectfully request that the rejection of Claims 20-21 under 35 U.S.C. §103(a) to *Yasutaka* in view of *Voss* be withdrawn.

For the foregoing reasons, Applicants respectfully submit that the present application is in condition for allowance and earnestly solicit reconsideration of same.

Respectfully submitted,

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